

I/WE CLAIM:

1. A rapid cook oven comprising:
 - an oven cavity including an interior portion, and an open frontal portion; and
 - a convection cooking system for use in heating the oven cavity during a cooking operation, said convection cooking system including:
 - a housing;
 - an oven air passage enabling a flow of oven air into the housing;
 - a fresh air passage enabling a flow of fresh air into the housing;
 - a mixing chamber adapted to receive each of the flow of oven air and the flow of fresh air;
 - a combustion chamber defined in the housing;
 - an electric heating element positioned in the combustion chamber;
 - a recirculation passage adapted to pass a combined oven air flow mixture composed of the flow of oven air and the flow of fresh ambient air from the housing and into the oven cavity; and
 - a dual flow fan rotatably mounted in the housing, said dual flow fan including a first portion arranged to draw in the flow of oven air and a second portion arranged to draw in the flow of fresh air,

wherein operation of the dual flow fan combines the flow of oven air and the flow of fresh air and directs the combined air flow into the oven cavity through the combustion chamber in which the combined air flow is

passed over the heating element such that food byproducts contained within the combined air flow are consumed.

2. The rapid cook oven as recited in claim 1, wherein the combustion chamber extends annularly about the dual flow fan.
3. The rapid cook oven according to claim 2, wherein the electric heating element is constituted by a sheathed electric resistive heating element.
4. The rapid cook oven as recited in claim 3, wherein the electric heating element is a halo element including a plurality of substantially circular coils extending within the combustion chamber.
5. The rapid cook oven as recited in claim 1, further comprising: an exhaust air duct for exhausting air from the housing.
6. The rapid cook oven as recited in claim 5, wherein a portion of the combined air flow is exhausted through the exhaust air duct.
7. The rapid cook oven as recited in claim 6, wherein the exhaust air duct extends through the combustion chamber.
8. The rapid cook oven as recited in claim 1, further comprising: a microwave cooking system including a microwave generator and a waveguide for directing microwave energy into the cooking cavity.

11. A convection fan assembly for use in a convection cooking appliance comprising:
 - a housing;
 - an oven air passage adapted to receive a flow of oven air into the housing;
 - a fresh air passage enabling a flow of fresh air into the housing;
 - a mixing chamber adapted to receive each of the flow of oven air and the flow of fresh air;
 - a combustion chamber defined in the housing;
 - an electric heating element positioned in the combustion chamber;
 - a recirculation passage adapted to pass a combined oven air flow mixture composed of the flow of oven air and the flow of fresh ambient air from the housing; and
 - a dual flow fan rotatably mounted in the housing, said dual flow fan including a first portion arranged to draw in the flow of oven air and a second portion arranged to draw in the flow of fresh air, wherein operation of the dual flow fan combines the flow of oven air and the flow of fresh air and directs the combined air flow from the housing through the combustion chamber in which the combined air flow is passed over the heating element.
12. The convection fan assembly as recited in claim 11, wherein the combustion chamber extends annularly about the dual flow fan.
13. The convection fan assembly as recited in claim 12, wherein the electric heating element is constituted by a sheathed electric resistive heating element.

14. The convection fan assembly as recited in claim 13, wherein the electric heating element is a halo element including a plurality of substantially circular coils extending within the combustion chamber.
15. The convection fan assembly as recited in claim 11, further comprising: an exhaust air duct for exhausting air from the housing.
16. The convection fan assembly as recited in claim 15, wherein a portion of the combined air flow is exhausted through the exhaust air duct.
17. The convection fan assembly as recited in claim 16, wherein the exhaust air duct extends through the combustion chamber.
18. A method of performing an accelerated cooking operation in a rapid cook oven having an oven cavity and a convection cooking system comprising:
 - placing a food item within the oven cavity;
 - operating a dual flow fan having a first portion which draws in a flow of oven air having a first temperature from the oven cavity, and a second portion which draw in a flow of fresh air flow having a second temperature;
 - mixing the flow of oven air and the flow of fresh air in a mixing chamber forming a combined air flow having a temperature less than the first temperature;
 - directing the combined air flow into a combustion chamber having an electric heating element arranged therein;

heating the combined air flow with the electric heating element;
maintaining the combined air flow in the combustion chamber such
that contaminates carried by the combined air flow are combusted to
create a substantially clean, recirculation air flow; and
directing the recirculation air flow into the oven cavity such that
the recirculation air flow is directed upon the food item during the rapid
cooking operation.

19. The method of claim 18, further comprising: activating a microwave cooking system to perform at least a portion of the cooking operation.
20. The method of claim 18, further comprising: exhausting a portion of the combined air flow.
21. The method of claim 20, wherein the portion of the combined air flow which is exhausted flows through the combustion chamber.